FIG.1

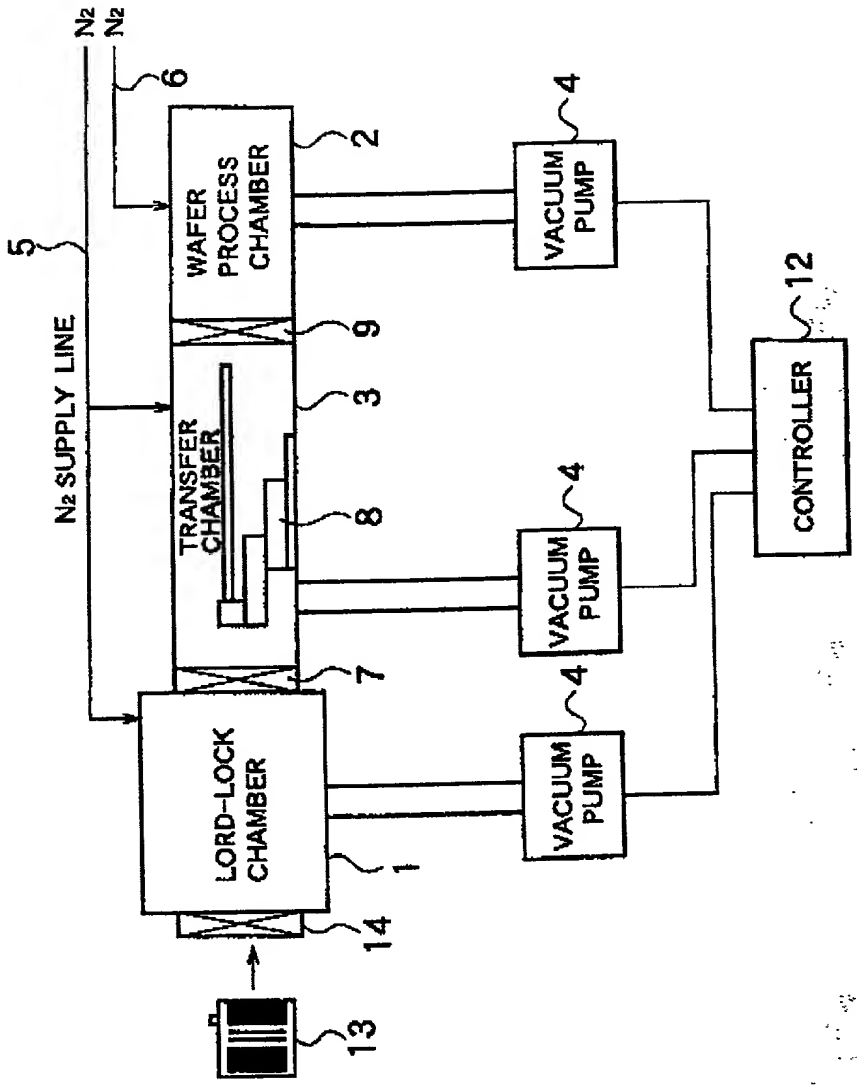

N2
N2
6
5
N2 SUPPLY LINE
WAFER PROCESS CHAMBER
2
TRANSFER CHAMBER
3
8
9
7
LORD-LOCK CHAMBER
1
14
13
VACUUM PUMP
4
VACUUM PUMP
4
VACUUM PUMP
4
CONTROLLER
12

FIG.2

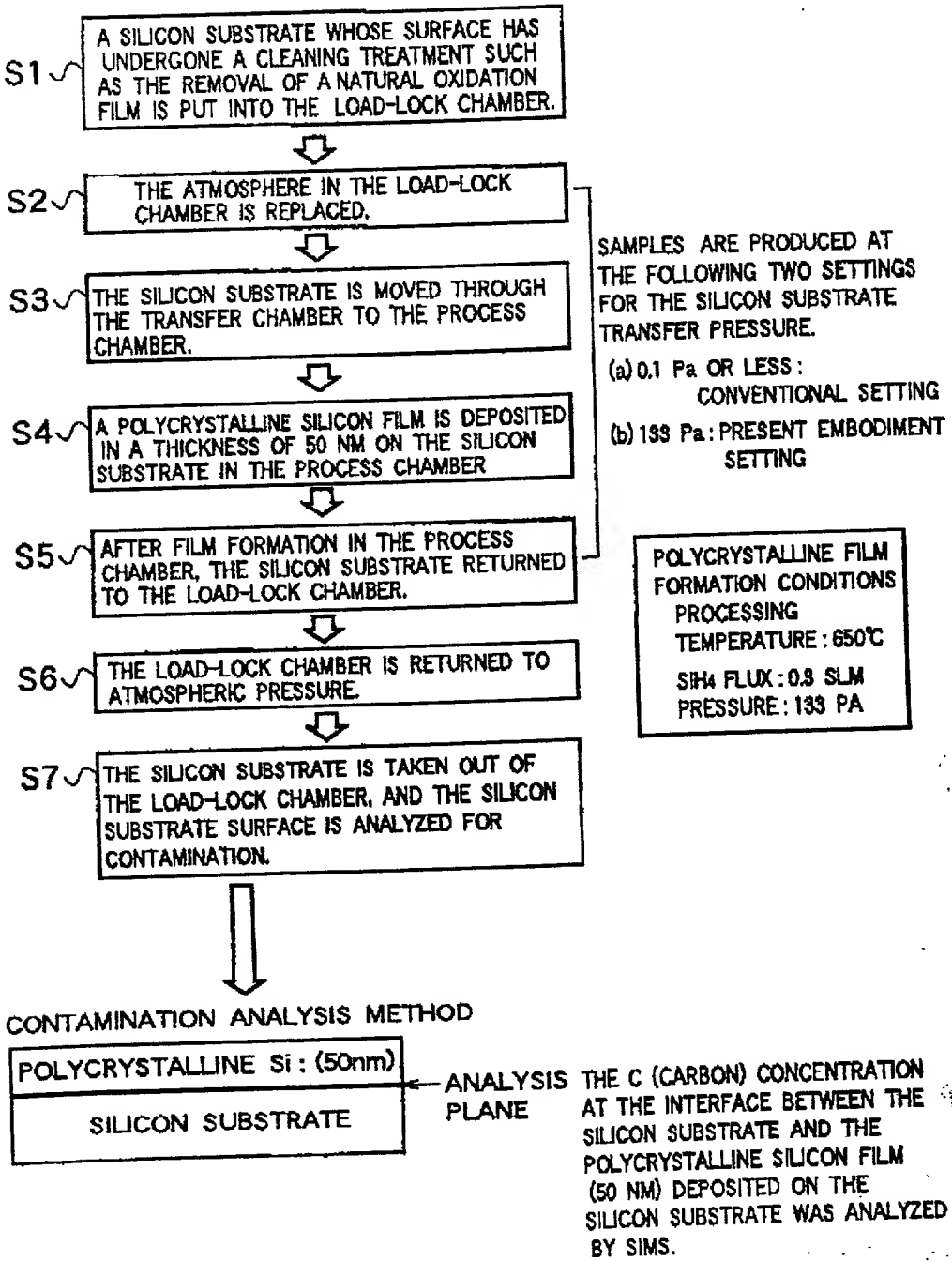

S1
A SILICON SUBSTRATE WHOSE SURFACE HAS UNDERGONE A CLEANING TREATMENT SUCH AS THE REMOVAL OF A NATURAL OXIDATION FILM IS PUT INTO THE LOAD-LOCK CHAMBER.
S2
THE ATMOSPHERE IN THE LOAD-LOCK CHAMBER IS REPLACED.
S3
THE SILICON SUBSTRATE IS MOVED THROUGH THE TRANSFER CHAMBER TO THE PROCESS CHAMBER.
S4
A POLYCRYSTALLINE SILICON FILM IS DEPOSITED IN A THICKNESS OF 50 NM ON THE SILICON SUBSTRATE IN THE PROCESS CHAMBER
S5
AFTER FILM FORMATION IN THE PROCESS CHAMBER, THE SILICON SUBSTRATE RETURNED TO THE LOAD-LOCK CHAMBER.
S6
THE LOAD-LOCK CHAMBER IS RETURNED TO ATMOSPHERIC PRESSURE.
S7
THE SILICON SUBSTRATE IS TAKEN OUT OF THE LOAD-LOCK CHAMBER, AND THE SILICON SUBSTRATE SURFACE IS ANALYZED FOR CONTAMINATION.
SAMPLES ARE PRODUCED AT THE FOLLOWING TWO SETTINGS FOR THE SILICON SUBSTRATE TRANSFER PRESSURE.
(a) 0.1 Pa OR LESS : CONVENTIONAL SETTING
(b) 133 Pa : PRESENT EMBODIMENT SETTING
POLYCRYSTALLINE FILM FORMATION CONDITIONS
PROCESSING TEMPERATURE : 650℃
SiH4 FLUX : 0.3 SLM
PRESSURE : 133 PA
CONTAMINATION ANALYSIS METHOD
POLYCRYSTALLINE Si : (50nm)
SILICON SUBSTRATE
ANALYSIS PLANE
THE C (CARBON) CONCENTRATION AT THE INTERFACE BETWEEN THE SILICON SUBSTRATE AND THE POLYCRYSTALLINE SILICON FILM (50 NM) DEPOSITED ON THE SILICON SUBSTRATE WAS ANALYZED BY SIMS.

FIG.3

SUBSTRATE TRANSFER PRESSURE		CARBON CONCENTRATION (atoms/cm^2)
(A) CONVENTIONAL SETTING	ATTAINABLE VACUUM TRANSFER 0.1Pa OR LESS	1.90×10^{14}
(B) PRESENT EMBODIMENT SETTING	133Pa	3.70×10^{13}

↓

5.0×10^{12} atoms/cm^2
(BEST DATA)

FIG.4

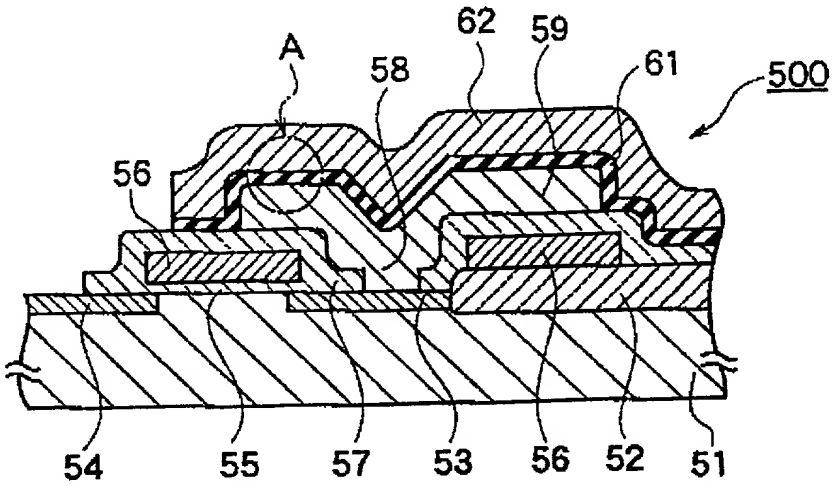


FIG.5

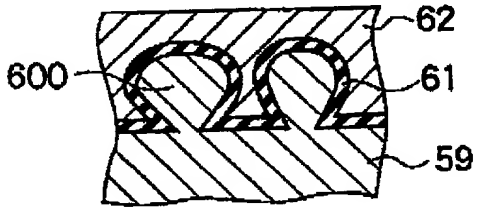


FIG.6

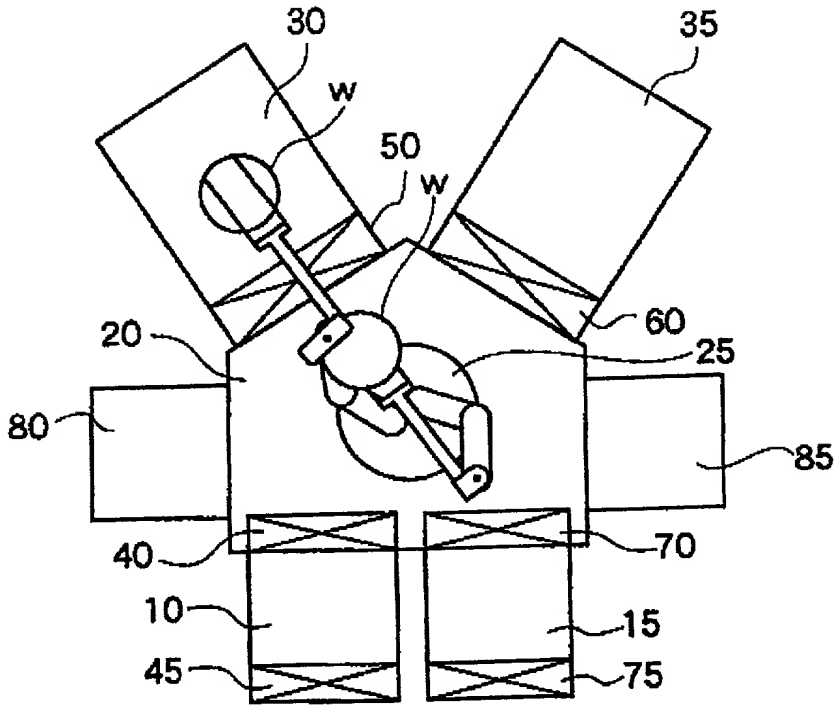


FIG.7

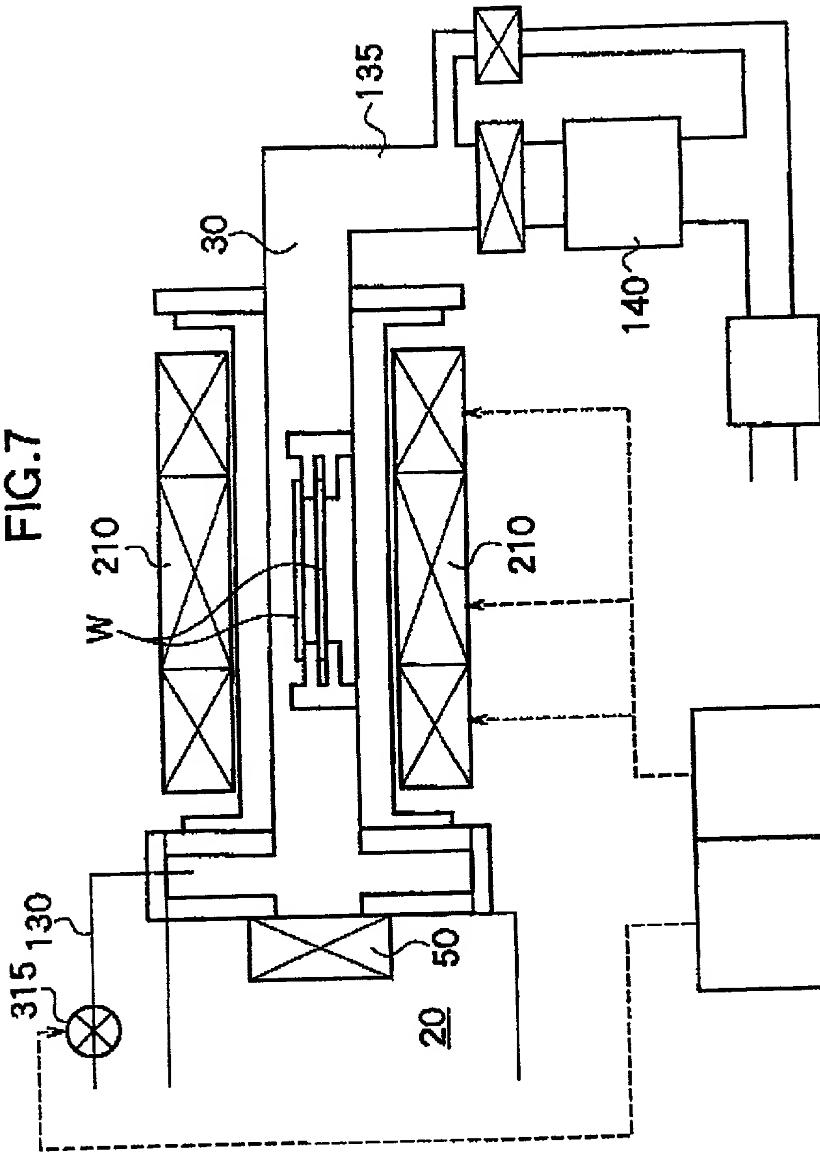
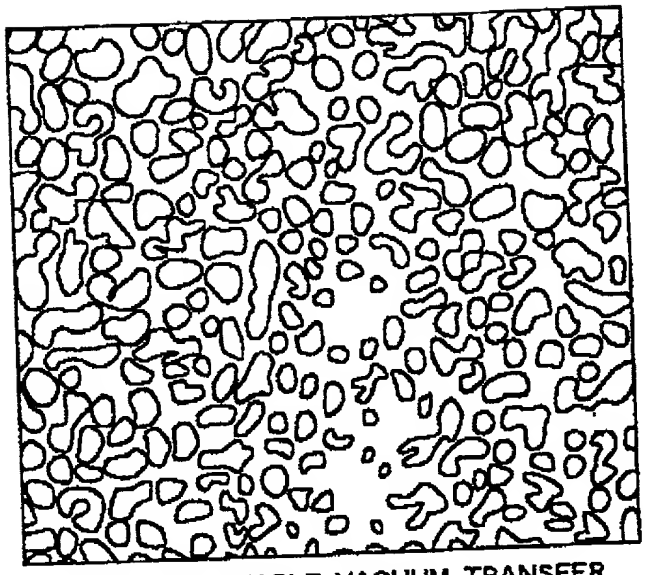
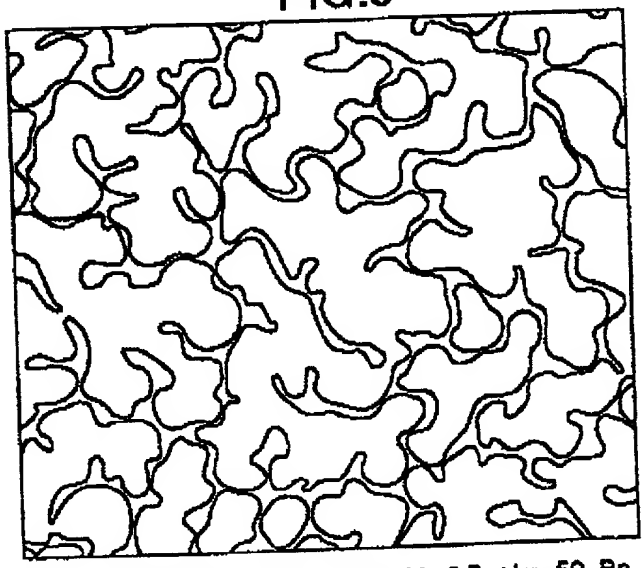


FIG.8



WITH ATTAINABLE VACUUM TRANSFER
INADEQUATE HSG FORMATION
(LACK OF SURFACE BUMPINESS)
DUE TO CONTAMINATION OF
WAFER SURFACE

FIG.9



WITH NITROGEN GAS SUPPLY: 0.5 slm, 50 Pa
ADEQUATE HSG FORMATION (VERY BUMPY SURFACE)